Midterm Study Guide

- **Monism** is the idea that the mind and body consist of the same substance (physical matter)
  - most monist take the position that the mind and everything else are physical. (materialistic monism)
- **Dualism** - the idea that the mind and the brain are seperate (physical + mental/spiritual)
- **Equipotentiality** - the idea that the brain functions as an undifferentiated whole. the extent of damage, not the location, is what determines how much function is lost. "every part of the brain is involved w/ everything."
- **Localization** - the idea that specific areas of the brain carry out specific functions
  - **Functions** are as much distributed as they are localized; behavior results from the interaction of many wide spread areas of the brain."
  - **Genotypes** (combinations of genes) - must phenotype are influenced by genotypes.
  - **Phenotype** (characteristics) description of physical or behavioral
  - **Physiological** - relating to the branch of biology that deals with the normal functions of living organisms and their parts.
  - **Ontogeny** - the origin and development of individual organisms.
  - **Genes** do not provide explanations of behavior but they control the production of proteins. (behavior is influenced by genes)
  - **Proteins** - affect the development of brain structures + the production of neural transmitters and the receptors that respond to them
    - RNA codes are for making proteins
    1. Provides structure of cells.
    2. Governs body's chemical reaction (enzymes)

explanations of behavior

Genetics is the study of how organisms are transferred

→

OWCS CPC

CPC COWS

- chromosomes - 23 pairs per cell
  XY - male XX - female
- sperm cells can give X or Y sex chromosome
- ovum only gives X chromosomes
- heritability: Genetic influence on our behaviors
  about half of the differences in behavioral characteristics among people are attributed to heredity.
  50% intelligence, 60% to 90% SKITZ, 40% to 50% personality characteristics
  90% height
- important molecules & ions: oxygen - O_2
  chloride: Cl^- water - H_2O
  Potassium - K^+ carbon Dioxide - CO_2
  Calcium - Ca^{++} sodium - Na^+
- Neuron - communication specialist
  - estimated 100 billion in the brain
  - irreplaceable (mostly) - O_2 required to process glucose
  - use glucose for energy
- Neuron membranes - made of 2 layers of lipid molecules. - impermeable except to a few molecules * THC can get through the membrane
  H_2O, O_2, CO_2
  - Protein channels allow only a few ions to pass. (Na^+, K^+)
  Major parts: 4 main parts
- Dendrites - recieves input from sensory structures & other neurons (branched like roots of a plant
- Soma - cell body of neuron, POWERPLANT
- Axon - passes messages away from the cell body to nuerons/muscles
  - covered w myelin sheath (which helps speed neural impulses)
- Pre-synaptic - store, release, reabsorb chemicals used for neuron communication

more than one)

ONLY 1

- **Sensory Neurons** ("outside in")
  - get physical info from the environment to the nervous system (located in dorsal ganglia of spinal cord)
- **Motor Neurons**: - initiate movement (impulses pass from brain to muscle)

REFLEXES

- **Interneurons** - a neuron that transmits impulses between other neurons (dendrite + axon are within the same structure (brain or spinal cord))

4 types

- **Glial Cells**: surround neurons and provide support for and insulation. "supporting cells" 2-5x + prevalent

Functions of Glia Cells

(yellow)
- **Oligodendrocytes** - myelinates axons of the neurons in the Central Nervous System

(blue)
- **Schwann** - myelinates axons of the neurons in the Peripheral Nervous System
  - guide axon regrowth - guide neuron migration

Radial Glia - helps development

(green)
- **Microglia** - synchronize activity of neurons
  - cleans up cellular debris and dead neurons from nervous tissue via phagocytosis (cell eating)
  - mediate immune responses in the CNS

(red)
- **Astrocytes** - support & repair neurons (axon guidance)
  - control/form the blood brain barrier and blood flow
  - synaptic support (synapses between nerve cells)

(BBB)
- **Blood Brain Barrier**
  - tight arrangements of cells in the brains blood vessels. * NOT a membrane *
  - controls what can and cannot pass through to the brain.
- **Neuron Communication**: communicate via sudden electrical & chemical events. the synapse is the gap between neurons & muscles" or "neurons & glands"
  - * Within - Action Potential (electrical current)
  - * Between - Neurotransmitters (chemicals, gases)

ample

Potential"

cess:

ess

(jumps from node to node)

- **Resting potential**: electrical potential of a neuron when not stimulated or involved.
  - Resting x Action: a snake which is coiled to strike.
  - Resting potential: "on the go" - prepared state. *neuron is NOT in use but ready to use*
  - "electrical difference"
  - the membrane becomes polarized so theres more negative voltage inside the neuron. (positive outside)
  - Na^+ & K^+ ions inside & outside
  - Na^+ channels shut
  - K^+ channels in membrane are "leaky"
  - sodium potassium pump in membrane
  - Pump: * 2 K^+ IN neuron / 3 Na^+ OUT of neuron.
- **Action Potential**: Polarized neuron membrane can be depolarized
  - rapid switch from negative to positive
  - Na^+ chanels open (axon hillock)
  - Na^+ rushes in axon: becomes positive inside
  - Positive charge flows down the axon
  - then cause neurotransmitter release.
- **Depolarization**: When the membrane potential becomes more positive (action potential likely)
- **Hyperpolarization**: when membrane potential is more negative. (action potential less likely)
  - Threshold of excitation - rapid switch
- Nodes of Ranvier: gaps in the myelin sheath.
  - it allows ions to move in and out of neuron
  - then the electrical signal flows down the axon
  - that causes salatory conduction "salsa"
- **Synapse**: A gap that impulses pass by diffusion of a neurotransmitter
  - Presynaptic neuron (A) releases neurontrans...
  - Postsynaptic neuron (B) recieves neurotransmitter at its receptor sites

- [redacted]: chemicals, liquids or gas influence the membrane of neuron B (post)

- [redacted] (Presynaptic)
synthesis of NT occurs in: cell body (then transported) Axon terminal
Storage in vesicles

- [redacted] (Postsynaptic)
NT's fit specific receptor sites (on dendrites)
- open ion channels (ionotrophic receptors) or Na+
- starts a metabolic reaction
- >1 receptor type for a single NT

Action Potential
↓
Ca^{++} ions enter A
↓
NT gets released

- [redacted]: the part of a nerve that receives and reads chemical signals

- [redacted]: a chemical that binds to a receptor and activates it to produce a response.
- [redacted]: bully, blocks agonist from having reaction.
causes opposite response to occur.
- [redacted]: graded potentials can be summated to create an action in B
(time) [redacted] - repeated excitatory messages from neuron A
(space) [redacted] - multiple exitatory messages coming from Neurons A1, A2, A3

prolif: Stem - neurons sl...

lateral - side
medial - middle
Dorsal - top
Ventral - bottom
anterior - Front
posterior - back
superior - above
inferior - below

CNS - brain & spinal cord

sensory
motor

spinal cord: 30 segments
gray matter somas & dendrites

sensory - dorsal
motor - ventrally

HIND

M P RF

Athletes love cerebellum

MID - sensations & movements
VTA - reward pathways

F P O T

3 Occipital - visual primary
1 Frontal - motor cortex
prefrontal ⇒ morals
2 Parietal - body, pain
4 temp - auditory olfaction
emotional behavior